Regional Supervisor, Division of Wildlife Refuges — February 17, 1971

Regional Engineer — EN-H-R-Tewaukon
Annual Water Program

Tewaukon NWR - 1971 Annual Water Program

We have reviewed and concur in the subject program.

The manager has done an excellent job of summarizing the water management at this refuge during 1970.

The proposed inspection and repair of the Storm Lake control and inlet channel should improve on public relations as well as the wildlife habitat. Judging from information in our files, this work has been required for sometime.

We should be careful while making any repairs, or during subsequent regulation of the Storm Lake control structure, that the normal high water lake level is not exceeded. The maximum lake level with respect to the invert of the existing control structure is shown on the attached easement drawing R1218. The maximum lake level is 92.5 and the invert of the gate control is 91.0 assumed elevation. Please advise, if any engineering assistance is required.

John D. Umberger

Attachment

CC: Refuges--RO
Photo Chron in Photo Index
SCBrashears/CWStephan:ce

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CC: Refuges--RO

Photos filed in Photo Index

SCBrashears/CWStephan:ce

ANNUAL WATER PROGRAM - TEWAUKO REFUGE

I. 1970 Water Use Data

IMPOUNDMENT DATA

Pool 1, Lake Tewaukon for Calendar Year 1970

Month	Minimum Elevation Ft.-msl	Minimum Area (acres)	Minimum Capacity (ac.-ft)	Maximum Elevation Ft.-msl	Maximum Area (acres)	Maximum Capacity (ac.-ft.)
Jan.	*1147.20	1245	8610	*1147.20	1245	8610
Feb.	*1147.20	1245	8610	*1147.20	1245	8610
Mar.	*1147.20	1245	8610	*1147.20	1245	8610
Apr.	*1147.40	1253	8870	1147.60	1261	9120
May	1147.60	1261	9120	1147.90	1271	9500
June	1147.60	1261	9120 (1235)	1147.70	1265	9240
July	1147.10	1241 (1228)	8490	1147.60	1261 (1241)	9120
Aug.	1146.60	1220	8000	1147.10	1241	8490
Sept.	1146.10	1180	7150	1146.50	1210	7750
Oct.	1146.10	1180	7150	1146.10	1180	7150
Nov.	*1146.15	1185	7350	*1146.15	1185	7350
Dec.	*1146.15	1185	7350	*1146.15	1185	7350

Pool 2, Cutler's Marsh for Calendar Year 1970

Month	Minimum Elevation Ft.-msl	Minimum Area (acres)	Minimum Capacity (ac.-ft.)	Maximum Elevation Ft.-msl	Maximum Area (acres)	Maximum Capacity (ac.-ft.)
Jan.	*1151.40	262	945	*1151.40	262	945
Feb.	*1151.40	262	945	*1151.40	262	945
Mar.	*1151.20	256	878	*1151.40	262	945
Apr.	*1151.20	256	878	1153.20	306	1960
May	1152.60	296	1392	1153.70	312	2200
June	1151.50	264	972 (252)	1152.60	296 (263)	1392
July	1150.40	238 (241)	719	1151.50	264	972
Aug.	1149.75	218	582	1150.40	238	719
Sept.	1149.50	210	518	1149.75	218	582
Oct.	1149.40	206	502	1149.50	210	518
Nov.	*1149.50	210	518	*1149.50	210	518
Dec.	*1149.50	210	518	*1149.50	210	518

Pool 3, Maka Pool for Calendar Year 1970

Month	Minimum Elevation Ft.-msl	Minimum Area (acres)	Minimum Capacity (ac.-ft.)	Maximum Elevation Ft.-msl	Maximum Area (acres)	Maximum Capacity (ac.-ft.)
Jan.	*1153.55	111	330	*1153.55	111	330
Feb.	*1153.55	111	330	*1153.55	111	330
Mar.	*1153.55	111	330	*1153.75	112	355
April	*1153.75	112	355	1154.10	114	390
May	1154.10	114	390	1154.10	114	390
June	1154.10	114 (95)	390 (100)	1154.15	114 (105)	395
July	1153.35	110	305	1154.15	114	395
Aug.	1152.70	106	235	1153.35	110	305
Sept.	1151.50	55	125	1152.50	106	225
Oct.	1151.50	55	125	1151.55	65	155
Nov.	*1151.65	80	175	*1151.70	85	180
Dec.	*1151.70	85	180	*1151.70	85	180

*Ice

Pool 4 for Calendar Year 1970

Month	Minimum Elevation Ft.-msl	Minimum Area (acres)	Minimum Capacity (ac.-ft.)	Maximum Elevation Ft.-msl	Maximum Area (acres)	Maximum Capacity (ac.-ft.)
Jan.	*1158.65	85	242	*1158.65	85	242
Feb.	*1158.65	85	242	*1158.65	85	242
Mar.	*1158.65	85	242	*1158.80	89	250
Apr.	*1158.80	89	250	1159.10	96	266
May	1159.10	96	266	1159.10	96	266
June	1158.90	91	256 (63)	1159.10	96	266
July	1158.00	69 56	208	1158.90	91 70	256
Aug.	1156.90	46	160	1158.00	69	208
Sept.	dry	-	-	1156.80	45	157
Oct.	dry	-	-	dry	-	-
Nov.	dry	-	-	dry	-	-
Dec.	dry	-	-	dry	-	-

Pool 8, Hopi Lake for Calendar Year 1970

Month	Minimum Elevation Ft.-msl	Minimum Area (acres)	Minimum Capacity (ac.-ft.)	Maximum Elevation Ft.-msl	Maximum Area (acres)	Maximum Capacity (ac.-ft.)
Jan.	*1175.45	106	350	*1175.45	106	350
Feb.	*1175.45	106	350	*1175.45	106	350
Mar.	*1175.45	106	350	*1175.55	106	360
Apr.	*1175.55	106	360	1176.63	108	475
May	1176.05	107	393	1176.63	108	475
June	1176.05	107	393	1178.13	110	640
July	1177.80	109 107	605 (104)	1178.13	110 109	640
Aug.	1176.63	108	475	1177.80	109	605
Sept.	1176.13	107	420	1176.50	108	460
Oct.	1176.13	107	420	1176.13	107	420
Nov.	*1176.10	107	415	*1176.10	107	415
Dec.	*1176.10	107	415	*1176.10	107	415

Pool 11, West White Lake for Calendar Year 1970

Month	Minimum Elevation Ft.-msl	Minimum Area (acres)	Minimum Capacity (ac.-ft.)	Maximum Elevation Ft.-msl	Maximum Area (acres)	Maximum Capacity (ac.-ft.)
Jan.	*1148.65	52	100	*1148.65	52	100
Feb.	*1148.65	52	100	*1148.65	52	100
Mar.	*1148.65	52	100	*1148.90	55	113
Apr.	*1148.90	55	113	1149.10	58	125
May	1149.00	57	119	1149.10	58	125
June	1149.00	57	119 (50)	1149.10	58	125
July	1148.80	54 48	107	1149.10	58 52	125
Aug.	1148.10	43	73	1148.80	54	107
Sept.	1147.40	35	61	1148.00	42	67
Oct.	1147.40	35	61	1147.40	35	61
Nov.	*1147.40	35	61	*1147.40	35	61
Dec.	*1147.40	35	61	*1147.40	35	61

*Reading, top of ice.

Pool 12, East White Lake for Calendar Year 1970

Month	Minimum Elevation Ft.-msl	Minimum Area (acres)	Minimum Capacity (ac.-ft.)	Maximum Elevation Ft.-msl	Maximum Area (acres)	Maximum Capacity (ac.-ft.)
Jan.	*1148.65	103	470	*1148.65	103	470
Feb.	*1148.65	103	470	*1148.65	103	470
Mar.	*1148.65	103	470	*1148.90	103	490
Apr.	*1148.90	103	490	1149.10	103	510
May	1149.00	103	500	1149.10	103	510
June	1148.85	103	485	1149.00	103	500
July	1148.55	102	455	1148.85	103	485
Aug.	1148.00	102	400	1148.55	102	455
Sept.	1147.60	101	360	1147.90	102	390
Oct.	1147.55	101	355	1147.60	101	360
Nov.	*1147.50	101	350	*1147.50	101	350
Dec.	*1147.50	101	350	*1147.50	101	350

102 (102) (107)

Pool 13, Mann Lake for Calendar Year 1970

Month	Minimum Elevation Ft.-msl	Minimum Area (acres)	Minimum Capacity (ac.-ft.)	Maximum Elevation Ft.-msl	Maximum Area (acres)	Maximum Capacity (ac.-ft.)
Jan.	*1208.50	45	179	*1208.50	45	179
Feb.	*1208.50	45	179	*1208.50	45	179
Mar.	*1208.50	45	179	*1208.70	46	189
Apr.	*1208.70	46	189	1210.00	52	250
May	1209.50	50	232	1210.00	52	250
June	1208.80	47	193	1209.50	50	232
July	1208.35	44	173	1208.80	47	193
Aug.	1208.00	42	158	1208.35	44	173
Sept.	1207.45	39	133	1207.90	41	148
Oct.	1207.25	37	125	1207.45	39	133
Nov.	*1207.25	37	125	*1207.25	37	125
Dec.	*1207.25	37	125	*1207.25	37	125

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Pool 14, Sprague Lake for Calendar Year 1970

Month	Minimum Elevation Ft.-msl	Minimum Area (acres)	Minimum Capacity (ac.-ft.)	Maximum Elevation Ft.-msl	Maximum Area (acres)	Maximum Capacity (ac.-ft.)
Jan.	* 1210.50	167	887	*1210.50	167	887
Feb.	*1210.50	167	887	*1210.50	167	887
Mar.	*1210.50	167	887	*1210.70	168	893
Apr.	*1210.70	168	893	1212.90	186	1183
May	1212.60	182	1140	1212.90	186	1183
June	1212.10	180	1065	1212.90	186	1183
July	1211.70	177	1005	1212.10	180	1065
Aug.	1211.20	174	937	1211.70	177	1005
Sept.	1210.60	167	890	1211.10	173	915
Oct.	1210.35	164	702	1210.60	167	890
Nov.	*1210.30	163	687	1210.30	163	687
Dec.	*1210.30	163	687	1210.30	163	687

173 (174) 179

*Reading, top of ice.

Small Impoundments, 1970 (Hepi Lake Drainage)
(Minimum Monthly Elevations)

Month	Pool 2A	Pool 3A	Pool 5	Pool 6	Pool 7	Pool 7A
Jan.	1151.20*	1153.40*	dry	dry	1170.15*	1173.60**
Feb.	1151.20*	1153.40*	dry	dry	1170.15*	1173.60**
Mar.	1151.20*	1153.40*	dry	dry	1170.15*	1173.60*
April	1151.52	1153.75	dry	dry	1170.30	dry
May	1152.85	1154.35	dry	1165.00	1172.05	dry
June	1152.90	1154.10	1162.40	1167.78	1171.90	dry
July	1152.05	1153.77	1161.30	1166.64	1171.30	dry
Aug.	1151.20	1153.27	1161.30	1166.64	1171.30	dry
Sept.	1150.70	1152.70	1161.20	1167.10	1171.40	dry
Oct.	1150.50	1152.70	dry	dry	1171.30	dry
Nov.	1150.60*	1154.44*	dry	dry	1171.40*	dry
Dec.	1150.65*	1154.44*	dry	dry	1171.45*	dry

(Maximum Monthly Elevations)

Month	Pool 2A	Pool 3A	Pool 5	Pool 6	Pool 7	Pool 7A
Jan.	1151.20*	1153.40*	dry	dry	1170.15*	1173.60**
Feb.	1151.20*	1153.40*	dry	dry	1170.15*	1173.60**
Mar.	1151.52*	1153.75*	dry	dry	1170.30*	1173.80
Apr.	1152.85	1154.35	dry	1165.00	1172.05	1173.80
May	1153.20	1154.52	1162.80	1168.61	1172.40	dry
June	1153.20	1154.52	1162.80	1168.61	1172.40	dry
July	1152.90	1154.10	1162.40	1167.78	1171.90	dry
Aug.	1152.05	1153.77	1162.00	1167.85	1172.10	dry
Sept.	1151.10	1153.20	1161.80	1167.70	1171.90	dry
Oct.	1150.70	1155.10	1161.20	1167.10	1171.40	dry
Nov.	1150.65*	1154.80*	dry	dry	1171.45*	dry
Dec.	1150.65*	1154.44*	dry	dry	1171.45*	dry

*Reading, top of ice. **Estimated.

Tewaukon Refuge, Consumptive Water Use For 1970

Pool	A Avg. Annual Evap.	B 1970 Lake Rise	C Net Gain A+B	D Surface Acres	E Ac-Ft Gain CxD	F Outflow in Ac-Ft	G Total Inflow Ac-Ft E+F
Pool 14	2.65'	-.20'	2.45'	176	431	Unk	*
Pool 13	2.65'	-1.25'	1.40'	45	63	"	"
Pool 12	2.65'	-1.15'	1.50'	102	153	"	"
Pool 11	2.65'	-1.25'	1.40'	50	70	"	"
Pool 10	2.65'	.00'	2.65'	6	16	none	none
Pool 9	2.65'	.00'	2.65'	10	27	"	"
Pool 8	2.65'	+.65'	3.30'	108	356	Unk	*
Pool 7A	2.65'	-2.42'	.23'	-	0	"	"
Pool 7	2.65'	+1.30'	3.95'	16	63	"	"
Pool 6	2.65'	.00'	2.65'	6	16	"	"
Pool 5	2.65'	.00'	2.65'	10	27	"	"
Pool 4	2.65'	-7.15'	-4.50'	46	-207	"	"
Pool 3A	2.65'	+1.04'	3.69'	6	22	"	"
Pool 3	2.65'	-1.85'	.80'	100	80	"	"
Pool 2A	2.65'	-.55'	2.10'	16	34	"	"
Pool 2	2.65'	-1.90'	.75'	252	189	"	"
Pool 1	2.65'	-1.05'	1.60'	1235	1976	3262	5238

*Not calculated.

Outflow Data, 1970, In C.F.S.

Lake Tewaukon Structure

Date	March	April	May	June	July
1	None*	10.50*	29.40*	10.50*	4.10*
2	7.52	14.87	29.40	10.50	2.44
3	7.52	14.87	0*	10.50	2.44
4	7.52	14.87	0	10.50	2.44
5	7.52	14.87	0	10.50	2.44
6	15.05*	14.87	0	10.50	2.44
7	13.28	14.87	0	10.50	2.44
8	13.28	14.87	0	10.50	.78*
9	13.28	14.87	0	10.50	.39
10	13.28	14.87	0	10.50	.39
11	13.28	14.87	0	10.50	.39
12	13.28	14.87	0	10.50	.39
13	13.28	14.87	0	10.50	.39
14	13.28	14.87	0*	10.50	.39
15	13.28	19.25*	29.05*	10.50	.39
16	13.28	24.33	19.78	10.50	.39
17	13.28	24.33	19.78	10.50	.39
18	13.28	24.33	19.78	10.50	.39
19	10.50*	24.33	19.78	10.50*	0*
20	10.50	24.33	19.78	7.30	0
21	10.50	24.33	19.78	7.30	0
22	10.50	24.33	19.78	7.30	0
23	10.50	24.33	19.78	7.30	0
24	10.50	24.33	19.78	7.30	0
25	10.50	24.33	19.78	7.30	0
26	10.50	24.33	19.78	7.30	0
27	10.50	29.40*	19.78	7.30	0
28	10.50	29.40	19.78	7.30	0
29	10.50	29.40	19.78	7.30	0
30	10.50	29.40	19.78	4.10*	0
31	10.50*	-	10.50*	-	0
C.F.S. Total	340.99	608.29	395.05	276.60	23.42
Ac-Ft Total	676.34	1206.53	783.57	548.63	46.45

C.F.S. Grand Total = 1644.35 Ac-Ft Grand Total = 3261.52

*This is known data, all other figures are interpolations.

SUMMARY OF 1970 WATER PROGRAM

Winter Conditions

Except for January there was little snow cover on the ground in the refuge area, and topsoil erosion was quite severe during the winter months. Water levels in potholes were expected to be low without any snow around for runoff. However, we had an inch of rain on March 3rd which came down in a cloudburst. The ground was frozen so the precipitation that fell all ended up in the potholes, with some gaining six inches or more. The weather turned colder after this and it was not until April that spring breakup began.

Spring Runoff

Wild Rice River Watershed

There was little fluctuation in any of the pools until the first week of April when the weather warmed enough to melt the snow remaining in the watershed. Most pools on the refuge were ice free by April 9th. Mann Lake gained 1.3' in elevation during April to its peak spring reading of 1210.0 at the end of the month. Sprague Lake rose 2.2' during April to its peak spring elevation of 1212.9. Elevations in both pools started to recede in May.

The cloudburst of March 3rd added enough runoff water to Pools 1, 2, 3, and 4 to bring them up to spillway level. Pool 4 gained .45' during the spring, reaching a peak elevation of 1159.1 at the end of April. The logs were set at 1158.65. Pool 3 gained .55' from its winter reading and was at 1154.1 by the end of April. Stoplogs were added to the spillway of Pool 2 to flood more cattail in the upper end of the pool. It rose 1.8' to 1153.2 by the end of April. Water began flowing from Pool 1 shortly after the March cloudburst. Lake Tewaukon's elevation had raised .7' to 1147.9 by May 14th. It receded after this.

White Lake Watershed

The water level in East and West White Lake was generally stable during spring runoff. Both lakes raised almost .5' from runoff and precipitation.

Hepi Lake Watershed

Water didn't start running into Hepi Lake from T-2 watershed dam until early April. By the end of the month this inflow had raised Hepi about 1' in elevation. No water releases were made from Hepi Lake to downstream pools until May.

The outlet on Pool 7A was allowed to remain open during the spring runoff to dry the pool up so it could be farmed. Runoff from this pool was passed through to Pool 7 which gained almost two feet in elevation.

The control gates on Pools 6 and 5 were left open this spring. We had seeded both pools to rye in the fall of 1969 and wanted to give the rye a chance to grow before it was flooded for invertebrate production for waterfowl food.

Pool 3A gained about one foot during the spring from water passing through upstream pools. Pool 2A gained .6' from upstream runoff and then an additional 1' was added by backing water in from Pool 2.

Summer Water Conditions

Wild Rice River Watershed

Heavy rains in June sent river levels up higher than they were in the spring but the river dried up fast after this. By early August it was bone-dry and cattle watering became a problem for some local farmers.

Mann Lake dropped .7' during June and receded at a slower rate until freeze-up. Going into winter it read 1207.25, 1.25' lower than last fall.

Heavy rains in the hills south of Sprague Lake filled T-1A watershed dam and added some water to the lake. It dropped considerably during the summer and was at 1210.3 at freeze-up. The June rains filled Sprague Lake causing water to run into Mann Lake. With high water many carp and northern pike ran into Sprague Lake and fishing was good all summer. A beaver has a cache on the south shore of the lake this winter. Turbid water is still received from T-1A watershed dam into Sprague Lake but it is not as heavily riled as it has been in the past.

The water level in Pool 4 receded at the rate of one foot per month during the summer. By September the pool held water only in the river channel. We dried the pool up then, to aerate the bottom and lower the pool level enough to kill the carp infested in the pool. At freeze-up it was dry. Many species of water and shorebirds moved in as we were drying up the pool which concentrated the food supply. After last years flood the vegetation is now becoming established on the dike of Pool 4.

Pool 3 was held at 1154.0 after the spring runoff. However, with the dry year it had dropped to 1151.7 at freeze-up. The Nickeson dike was widened and raised to the level of Dam 4 during the summer. Cattail became more established in Pool 3 but it was well used by waterfowl. It held water only in the river channel and Mud Slough this fall.

Pool 2 held at 1152.+ after spring runoff. Some stoplogs were removed in June to cut down bank erosion and start pondweeds growing. By fall it read 1149.5. At this level the pool should winter-kill. The stoplogs shifted after freeze-up but the leak has been stopped.

The water level in Pool 1 held at 1147+ during much of the summer. It had dropped to 1146.15 by freeze-up, about one foot lower than last year. It was well used by fishermen this spring but didn't get much fall use. Water quality was poor with a large algae bloom in July which turned the water and shoreline blue-green. A family of beaver set up housekeeping on Skroch's Bay this fall, just 100 yards south of Quarters No. 2. Lake Tewaukon was froze over by November 22 except around the "Point". Most smaller impoundments were frozen over by November 12th.

White Lake Watershed

East and West White Lake were at 1149.1 after spring runoff. Both lakes lost about 1.7' in elevation by fall when East White Lake read 1147.4 and West White Lake was at 1147.5. The west end of West White Lake is overgrown with cattail and some control is needed. Any fish in the west side should freeze out this winter. Thousands of minnows and small trash fish became trapped in the downstream side of Pool 11 structure this fall and suffocated.

Hepi Lake Watershed

Hepi Lake was at 1176.63 after spring runoff. The control gate was opened on May 13th to fill the pools downstream of Hepi Lake. The gate was closed May 27th with about .6' of water used from the pool. Heavy rains in June raised Hepi Lake to 1178.13 by the end of the month. The gate was opened again on July 30th to add water to Pools 5, 6 and 7 and was at 1176.1 at freeze-up. There will be enough water in Hepi Lake to flood downstream pools in the spring of 1971. The lake continues to be barren of emergent vegetation.

Pool 7A remained dry during the summer and was seeded to barley. We'll flood it in the spring of 1971 to attract breeding pairs of ducks. Fall migrant waterfowl used the barley some this fall.

Pool 7 was held at 1172 during the summer and early fall. Water was added from Hepi Lake to maintain this elevation. The upper end of the pool is becoming overgrown with cattail.

Pools 6 and 5 were kept dry until late April so the rye seeded in the pools could grow. The pools were filled to overflowing by late May from water stored in Hepi Lake. On June 30th 10,000 one inch long walleye fingerlings were put in Pool 6 and 25,000 were added to Pool 5. The pools were dried up in October and 3,000 walleyes

three to eight inches long were trapped out of the pools and stocked into Lake Tewaukon.

Pool 3A elevation was at 1153 to 54 during the summer. Cattail is becoming a problem in the pool and should be controlled. The pool leaks because of muskrat runs through the dike. The water from Pools 5 and 6 filled Pool 3A to 1155.1 by October 30th but it had dropped to 1154.44 by freeze-up.

Pool 2A held at 1152 until the hot weather of summer hit. It dropped rapidly after this to 1150.65 by freeze-up. The pool is 90% overgrown with cattail. It too, has probably got muskrat runs through the dike into Pool 2.

Potholes

With only 2 to 4 inches of snow cover on the ground in February and early March it looked as if the potholes wouldn't get much runoff after it warmed up. And, they wouldn't have if we hadn't received the cloudburst of March 3rd, which added over 6" of moisture to some of the potholes. Then in June we again had two or three cloudbursts and most of this was runoff. There was considerable erosion along with the downpours of June, especially in summerfallow. However, the hot, dry weather of August dried up Type I and many Type III potholes. Potholes this fall were in the worst shape they've been in for some time. Because they dried up we cleaned many of them out this fall with the dozer. The accumulation of silt, blowing dirt and decaying vegetation is slowly filling in most of the potholes on the refuge.

A small control gate and dike were constructed on one pothole near the outlet of the Wild Rice River from Lake Tewaukon. We can flood this from the lake. The flowing well just south of the office was piped underground to a pothole 700' north of the well. The pothole, dry before, filled to overflowing this fall and a family of beaver moved in. If they survive the winter we expect them to dam the pothole next spring increasing it in size.

Food, Cover and Waterfowl Use

Pool 1 was used primarily as a resting and watering area for migrant waterfowl. The lake is barren of emergent vegetation and probably supports little pondweed growth. Some brood use was noted in Skroch's Bay. The bay also received fair use by dabbling ducks, although it is infested with carp. It should freeze out this winter.

The heavy growth of cattail in the upper end of Pool 2 along with broken down trees and interspersion again made it attractive to moulting ducks. It has some submergent growth and was used during the fall migration for watering and resting. Herons and bitterns make good use of the pool. A few broods were observed in the west end.

Pool 3 was also used by moulting ducks and received good brood use. As the pool was drying up many waterbirds and shorebirds congregated on the mud flats of the pool. It received good use as a staging area for ducks this fall.

Pool 4 had good use during the spring when grasses in the upper end of the pool were flooded. It dried up early this fall but received some brood use. Quite a few shovelers made use of the pool as it was dewatered, and pelicans fished it, too.

Pools 5 and 6 had a crop of rye seeded in them and were flooded in the spring to attract breeding pairs. The pools were also salted down with 175 bushel of millet as the pools were filling. A few broods were seen on each impoundment during the summer. Two to three hundred ducks used each area during late August, mostly mallards and teal.

Pool 7 has a good pondweed growth and emergents in the upper end. It provided brood use and many redheads were observed on the area this fall.

Pool 8 received less use this year but was important for resting and watering during the fall migration. Sago growth in the pool was less than last year. The pool is barren of emergent vegetation.

Pools 9 and 10 had little brood use this year. Mallards made extensive use of Pool 9 during the fall migration.

Pool 11 received considerable use by coots and redheads during the summer. Many mallards used it this fall. Most of the west and south side of the pool is overgrown with cattail and phragmites. The east end which is open produced sago beds.

Pool 12 is barren of vegetation. No broods were observed on the pool this summer. It did have some geese on it this fall.

Pool 13 is full of carp and received little use. Pool 14 has some emergents but was used mainly by geese and ducks as a resting and watering area.

Pool 16 (Anderson-Halstad Unit) north of Mann Lake was used extensively by ducks during the year. Most noticeable was the redhead use it received this fall. It probably contains fish life because of the cormorants observed on the pool. It should freeze out this winter.

1970 Easement Refuge Water Use - Tewaukon District

Bonehill Refuge had high spring levels. By mid summer the levels were low due to lack of precipitation in the area until September when fall rains brought the pool up to normal.

The water was 15" below the spillway at the Maple River Refuge Dam at the start of the year. Spring runoff brought water overflow until mid May. By August 10th the water was already 15" below the spillway and by years end was 42" below. The low water made a feast for the raccoon feeding on the hundreds of clams which became available. Many of the clams were 5 inches in diameter.

Although a dry summer, the water level of Lake Elsie Refuge at years end was about normal.

Water conditions in Storm Lake Refuge were about the same as last year.

Water in the Wild Rice River Refuge stopped flowing in mid July and held little water the rest of the year.

Easement Refuges, Consumptive Water Use For 1970

Refuge	A Avg. Annual Evap.	B 1970 Lake Rise	C Net Gain A+B	D Surface Acres	E Ac-Ft Gain CxD	F Outflow in Ac-Ft	G Total Inflow Ac-Ft E+F
Bonehill	2.65'	.00*	2.65'	40	106	Unk.	Unk.
Lake Elsie	2.65'	+.20*	2.85'	318	906	Unk.	Unk.
Maple River	2.65'	-2.25	.40'	80	32	Unk.	Unk.
Storm Lake	2.65'	.00*	2.65'	181	480	Unk.	Unk.
Wild Rice	2.65'	.00*	2.65'	4	11	5,310	5,321

*These are estimated fugures.

Physical Condition of Control Structures

Bonehill Refuge

Good condition, see photos in 1966 report.

Lake Elsie Refuge

There are no control structures on this area.

Maple River Refuge

Control structure in good condition. Small structure north of new dam is ineffective.

Storm Lake Refuge

The control structure is ineffective. Several residents of Milnor have asked about improving Storm Lake. They'd like to see it deeper for fish or shallower for waterfowl foods. Since there appears to be significant local interest in this project, we plan to take some shots of the inlet ditch, and then plan to repair the structure for a better management elevation.

Wild Rice River Refuge

No control structure.

see Feb 3, 1967 Engr Comments unk

1971 ANNUAL WATER PROGRAM

The Water Program is described for the Tewaukon Unit and for the Sprague Lake Unit. The Tewaukon Unit is described according to water source: Wild Rice River, Direct; White Lake Watershed; and Hepi Lake Watershed.

Tewaukon Unit

I. Wild Rice River Watershed, Direct

Pool 4

We plan to keep this pool empty after spring runoff so that vegetation will establish in the pool. We'll then flood the pool in July for invertebrate production and brood use.

If it appears the river is going to dry up earlier we'll fill the pool before this.

Pool 4 should go into winter at about 1158 to encourage house building by muskrats.

Pool 3

The pool appears well used by waterfowl when only partially full. This pool will be flooded early for pair use, to about 1155.

The Nickeson Dike was rebuilt in 1970 which should stop seepage onto Nickeson's land. If seepage does occur the pool will have to be lowered to about 1154.

Enough water should remain in Pool 3 in the fall to encourage muskrat use.

Pool 2

We plan to hold it at 1152 through the summer and into the winter. A high stable level should flood out some cattail and encourage house building by muskrats. A good interspersion with lots of loafing places should improve Pool 2 for waterfowl use, though it is pretty good now.

Pool 1

Lake Tewaukon will be held at about 1147.5. This is high enough for fishery management and recreation without excessive back erosion.

Skroch's Bay will freeze out this winter. We hope to keep it free of large carp in the spring by fencing it off from Lake Tewaukon. However, if we get a heavy runoff this will be impossible . This will also serve to keep the northerns in Lake Tewaukon which now

run upstream and become stranded in the drainage southeast of the lake.

If large numbers of carp do get into Skroch's Bay we'll chemically eradicate them.

II. White Lake Watershed

Runoff from the T-2 or Frenier Dam is into Hepi Lake. The local runoff going into White Lakes should not be a problem.

Pool 11

There are few rough fish in the pool and it will probably winterkill. Stoplogs will be placed and locked down at 1150.5. We want all the water we can hold in Pool 11 without flooding private land to the south. If we can go to 1151.0, we'll do that. The pool should be held high into the winter.

Pool 12

This pool is of little value to waterfowl. As it is its a barren, open lake. We plan to dry the pool up this summer to start vegetation growing in the bottom. If needed the water will be pumped into Pool 11 to bring its elevation up to management level.

III. Hepi Lake Watershed

There is enough storage water in Hepi Lake to flood downstream pools in the spring. Additional water will be received with spring runoff.

Pool 10

No water will be added from Hepi Lake. We believe there are minnows in Hepi and don't want to infest Pool 10 with them.

Pool 9

No water will be let in from Hepi. There are probably minnows present but it may not be worth the effort to eradicate them. It was at a low level going into winter and may freeze out.

Pool 7A

We have a crop of barley in the pool now which we'll flood early in the spring for pair use. It will be dried up in August.

Pool 7

This will be filled early in the spring and remain full next fall.

Pool 6

This pool will be filled in the spring and kept full into the winter.

Pool 5

The same applies here.

Pool 3A

There appears to be a leak in this structure, either by the control gate not sealing or by seepage through the dike. This should be sealed and Pool 3A kept as full as we can get it. A heavy stand of emergents and an overgrown shoreline along the pool will be opened up by burning before ducks set up territories in the spring.

Pool 2A

This structure also leaks, either along the CMP or through the dike. Repairs must be made and the pool should be flooded. It is extensively overgrown with cattail which will be burned off and then the pool will be flooded.

Sprague Lake Unit

Sprague Lake

As there are no controls on this lake management of the water level is not possible.

Mann Lake

This lake is directly connected with the Wild Rice River and no water controls are available for regulating lake elevations. No management of water levels will be possible in 1971.

Pool 16

This pool lies north of Mann Lake in the Holstad-Anderson Unit recently exchanged for. No control of water levels is possible. We will attempt to establish a water gauge on it in 1971.

Potholes

In the last two years most potholes on the refuge were sprayed to kill the willows invading the shoreline. These have since been dozed or moved off. Some of these were burned. All need burning out during early spring.

We need to dig artificial Type I and III potholes as mentioned in the Master Plan. We also need to deepen existing potholes.

In the NW part of the refuge, along the Wild Rice River NW of Hepi Lake, there is flat land which could be developed like the 341 Development Unit at J. Clark Salyer. That is, a chain of dugouts connected by ditches and flooded from the river to form more pair territories.

Other possibilities exist for intensive management which we hope to prepare plans for and send in for review.

January 15, 1971

Herbert G. Troester

Herbert G. Troester
Refuge Manager